AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (currently amended) A quantum optical semiconductor device, comprising:

a semiconductor substrate; and

an active layer formed on said semiconductor substrate and including therein a quantum structure,

said quantum structure comprising:

a first barrier layer of a first semiconductor crystal having a first lattice constant and a first bandgap;

a second barrier layer of a second semiconductor crystal formed epitaxially on said first barrier layer, said second semiconductor crystal having a second lattice constant and a second bandgap;

a plurality of quantum dots formed in said second barrier layer, each of said quantum dots comprising a semiconductor crystal forming a strained system with regard to said first and second semiconductor crystals and having a lattice constant different from said first lattice constant and a bandgap smaller than any of said first and second bandgaps, each of said quantum dots having a height substantially identical with a thickness of said second barrier layer; and

a third barrier layer of a third semiconductor crystal formed on said second barrier layer, said third semiconductor crystal having a lattice constant different from said lattice constant of said semiconductor crystal constituting said quantum dot, said third semiconductor crystal further having a third bandgap larger than said bandgap of said semiconductor crystal forming said quantum dot,

said third barrier layer making a contact with an apex of said quantum dot formed in said second barrier layer,

wherein each of said quantum dots has an in-plane strain equal to or larger than a strain acting in a direction perpendicular to said substrate for the case where a tensile strain is defined to have a positive value and a compressive strain is defined to have a negative value.

Claim 2 (original) A quantum optical semiconductor device as claimed in claim 1, wherein said second and third barrier layers form together a continuous, single semiconductor layer.

Claim 3 (original) A quantum optical semiconductor device as claimed in claim 1, wherein said first barrier layer has a composition modified in the vicinity of said quantum dot, and wherein said third barrier layer has a composition modified in the vicinity of said quantum dot.

Claim 4 (original) A quantum optical semiconductor device as claimed in claim 3, wherein each of said first through third barrier layers is formed of a group III-V mixed semiconductor crystal containing In and Ga, each of said first and third barrier layers having an increased In content in the vicinity of said quantum dot.

Claim 5 (original) A quantum optical semiconductor device as claimed in claim 4, wherein said second barrier layer has an increased Ga content in the vicinity of said quantum dot.

Claim 6 (original) A quantum optical semiconductor device as claimed in claim 1, wherein each of said first semiconductor crystal, said second semiconductor crystal and said third semiconductor crystal achieved lattice-matching with respect to said semiconductor substrate.

Claim 7 (original) A quantum optical semiconductor device as claimed in claim 1, wherein said first and third semiconductor crystals have an identical composition.

Claim 8 (original) A quantum semiconductor device as claimed in claim 1, wherein said second lattice constant is larger or smaller than any of said first and third lattice constants.

Claim 9 (original) A quantum semiconductor device as claimed in claim 1, wherein each of said first through third semiconductor crystals is selected from the group consisting of an InGaAsP mixed crystal, an InAlGaAs mixed crystal, and an InAlGaP mixed crystal.

Claim 10 (canceled).

Claim 11 (original) A quantum semiconductor device as claimed in claim 1, wherein said semiconductor substrate comprises any of InP and GaAs.

Claim 12 (original) A quantum semiconductor device as claimed in claim 1, wherein said semiconductor substrate carries a first electrode, a first cladding layer being provided between said semiconductor substrate and said active layer, and a second electrode is provided on said active layer via a second cladding layer.

Claim 13 (original) A quantum optical semiconductor device as claimed in claim 1, wherein said quantum structure causes interaction with TM-mode optical radiation and TE-mode optical radiation with respective proportions, said proportion of interaction with a TM-mode optical radiation being equal to or larger than said proportion of interaction with a TE-mode optical radiation.

Claim 14 (currently amended) A quantum optical semiconductor device, comprising:

a semiconductor substrate; and

an active layer formed on said semiconductor substrate and including a quantum structure therein,

said quantum structure comprising:

a first barrier layer of a first semiconductor crystal having a first lattice constant and a first bandgap;

a second barrier layer of a second semiconductor crystal formed epitaxially on said first barrier layer, said second semiconductor crystal having a second lattice constant and a second bandgap;

a plurality of quantum dots formed in said second barrier layer, each of said quantum dots comprising a semiconductor crystal forming a strained system with respect to said first and second semiconductor crystals and having a lattice constant different from said first lattice constant and a bandgap smaller than any of said first and second bandgaps, each of said quantum dots having a height substantially equal to a thickness of said second barrier layer,

said first barrier layer and said second barrier layer being stacked alternately such that said first barrier layer makes a contact with an apex of said quantum dot in said second barrier layer,

said first barrier layer and said second barrier layer having respective, different

compositions,

wherein each of said quantum dots has an in-plane strain equal to or larger than a strain acting in a direction perpendicular to said substrate for the case where a tensile strain is defined to have a positive value and a compressive strain is defined to have a negative value.

Claim 15 (original) A quantum optical semiconductor device as claimed in claim 14, wherein said quantum dots are formed of InAs, and wherein said first and second barrier layers are formed of an InGaAsP mixed crystal.

Claim 16 (original) A quantum optical semiconductor device as claimed in claim 15, wherein said first barrier layer has a composition represented by compositional parameters x and y as $In_xGa_{1-x}As_yP_{1-y}$, and wherein said compositional parameter y is set to 0.65 or less.

Claim 17 (previously presented) A quantum optical semiconductor device, comprising:

a semiconductor substrate; and

an active layer formed on said semiconductor substrate and including a quantum structure therein,

said quantum structure comprising:

a barrier layer of a first semiconductor crystal having a first lattice constant and a first

bandgap;

a plurality of quantum dots formed in said barrier layer, each of said quantum dots comprising a semiconductor crystal forming a strained system with respect to said first semiconductor crystal and having a lattice constant different from said first lattice constant and a bandgap smaller than said first bandgap,

said barrier layer containing therein said plurality of quantum dots being stacked for a predetermined stack number,

wherein said predetermined stack number is set such that a proportion of interaction of said quantum dots to optical radiation of TM-mode is equal to or larger than a proportion of interaction of said quantum dots to optical radiation of TE-mode.

Claim 18 (original) A quantum optical semiconductor device as claimed in claim 17, wherein said barrier layer has a thickness exceeding a height of said quantum dots.

Claim 19 (original) A quantum optical semiconductor device as claimed in claim 17, wherein said semiconductor substrate and said barrier layer are formed of GaAs, said quantum dots are formed of InAs, and wherein said predetermined stack number is about eight.